



2023 Team Up Challenge

Team Paper



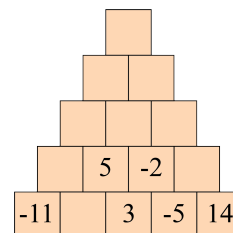
Tips to Get Started

- The questions in this paper increase in difficulty as you move through the paper. The last few questions require some careful thought.
- Each team member doesn't need to do every question. You can split the questions up, work together, or do a combination of both. Come up with a strategy that works for your team.

1. With 1 litre of cream, Sara can make 400 g of butter. How many litres of cream is needed to make 3200 g of butter?

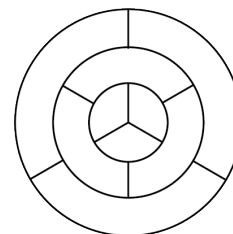
2. Yvan has 15 blocks which he stacks in a triangular arrangement. Six of the blocks are labelled with an integer, as shown.

The remaining blocks are to be labelled with an integer so that the sum of the integers in two adjacent blocks in a row is equal to the integer in the block above them. For example, $3 + (-5) = -2$. What integer label should be given to the block at the top of the stack?



3. Lia had her first swimming lesson on Tuesday, October 8th. She had a swimming lesson every Tuesday after that for a total of six lessons. What was the date of her last swimming lesson?

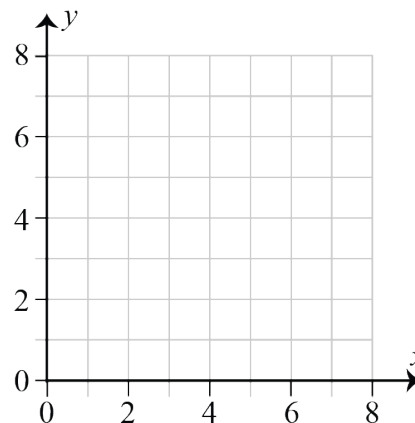
4. The diagram shown has nine different regions. Two regions are *bordering* if they share a common edge. Each region is to be coloured so that no two bordering regions are the same colour. What is the fewest number of colours needed?



5. Consider the grid shown. Penny draws a point on the grid with coordinates (x, y) so that

- x and y are integers,
- $x + y$ is even, and
- $x + y$ is less than 7.

How many possibilities are there for the coordinates (x, y) ?



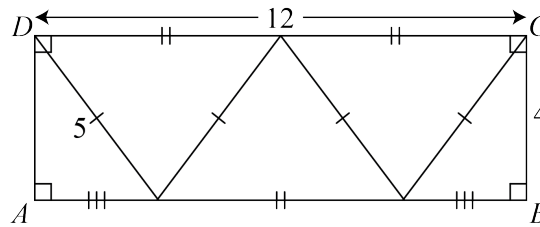


6. A three-dimensional figure was built using linking cubes. The figure, as well as its top view, are shown.

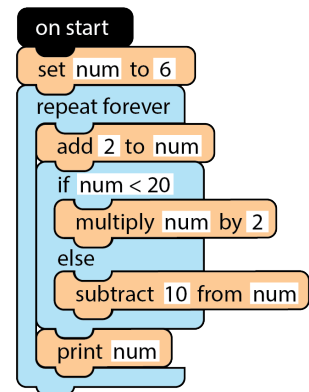


What is the maximum number of linking cubes in the three-dimensional figure?

7. Omar went to five different places yesterday. He went to the store after he went to both the pool and the forest. He went to the pool before he went to the forest. He went to the store after he went to the movies, but before he went to the library. He went to the movies after he went to the forest. Which place did he go to second?
8. Using the diagram below, Ming can draw connected paths from A to B by highlighting line segments. If Ming does not highlight the same line segment more than once, what is the length of the longest path that they can draw?



9. Aishah wrote a program using block coding to print a sequence of numbers. When her program is run, the first and second numbers printed are 16 and 36, respectively. What is the 2023rd number printed?



10. A game has red and blue tokens. All red tokens are worth the same number of points, and all blue tokens are worth the same number of points. Antwan knows the following:
- Six red tokens and five blue tokens are worth 54 points.
 - Two red tokens and three blue tokens are worth 26 points.

If Antwan has one red and one blue token, how many points does he have?



11. Jude has six containers. Their capacities in millilitres are shown, where N is an integer.



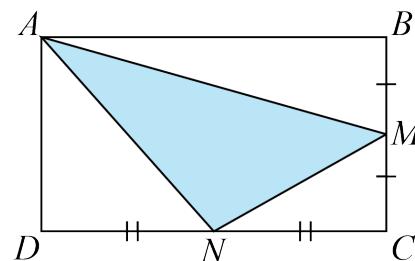
Jude conducts a series of tests to try and determine the value of N . For each test she chooses two containers, fills them each to the top with water, pours them both into the container with capacity N , and records whether or not it overflows. She then pours out the water and does another test using a different pair of containers until she has tested all 10 possible pairs. Only 4 of her tests resulted in the container overflowing. How many possible values of N are there?

12. The mass of 1 m^2 of a piece of paper measures its quality and is called its *weight*. For example, one piece of “300 weight” paper measuring 1 m by 1 m has a mass of 300 grams. What would be the mass, in grams, of a piece of “620 weight” paper measuring 25 cm by 30 cm?

13. A box contains some number of red marbles, some number of purple marbles, and exactly 75 yellow marbles. If the probability of selecting a red marble is 35% and the probability of selecting a purple marble is 50%, then how many purple marbles are there in the box?

14. In the diagram shown,

- $ABCD$ is a rectangle,
- M is on BC such that $BM = MC$, and
- N is on CD such that $CN = ND$.



If the area of rectangle $ABCD$ is 40 m^2 , what is the area, in m^2 , of $\triangle AMN$?

15. Frankie likes to think about interesting numbers. She learns that there is exactly one four-digit number whose digits reverse when it is multiplied by four. That is, if A , B , C , and D are the digits in the number then $ABCD \times 4 = DCBA$. What is the four-digit number $ABCD$?

$$\begin{array}{r} ABCD \\ \times \quad 4 \\ \hline DCBA \end{array}$$



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Team Paper Answer Sheet

Team: _____

Question	Answer
1	
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